Major Access Thoroughfare Study

Warsaw, Missouri

September, 2000

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prepared for

City of Warsaw, Missouri

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prepared by

GBA GEORGE BUTLER ASSOCIATES, INC.

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STUDY REPORT
MISSOURI TRAFFIC ENGINEER ASSISTANCE PROGRAM
by
George Butler Associates, Inc.
September, 2000

Project: Major Access Thoroughfares Study

Location: Warsaw, Missouri

Description: The City of Warsaw is experiencing a growth of tourist oriented development generated by the abutting Truman Reservoir, Lake of the Ozarks, and new Lost Valley State Fish Hatchery. This development has created an associated increase in the need to adequately provide for traffic access and circulation. A previous TEAP study, conducted in 1999, analyzed in detail the parking and traffic circulation needs in the Warsaw Central Business District surrounding the Benton County Court House. This subsequent thoroughfare study focused on the system of streets that provide access and circulation to and through the City.

EXISTING CONDITIONS

Study Area: The area included in this study is shown on the attached "Study Area" exhibit. As shown, the City's major thoroughfares which were studied included:

- Main Street from Missouri Route 7 to US Route 65
- Jackson Street from Truman Dam Access Road to Main Street
- Polk Street from Truman Dam Access Road to Main Street
- Commercial Street from Missouri Route 7 to Main Street

Existing Street System: The four streets listed above comprise the City's arterial street system. Missouri Route 7 and US Route 65 serve as major arterial routes for the City, in addition to their primary function as state thoroughfares connecting Warsaw to other cities and areas in the State. These two state maintained routes were not included in this study.

A review of the Warsaw's street system indicates that several other streets serve as collector routes, providing access between the local streets and the arterial street system. These include Hillcrest Lane, Lay Avenue, Kennedy Street, Kosciusko Street, Oak Street, Illinois Street, and Elm Street.

The attached "Average Street Widths" exhibit indicates the typical widths measured for each study route segment. These widths were measured either edge to edge of pavement, or back to back of curb, where applicable along sections of Main Street. As indicated:

- **Main Street** is the widest thoroughfare, providing a 60-foot width with curbs between V. Buren and Commercial Streets and a 48-foot width from Route 7 to Van Buren Street. Main Street narrows as it proceeds to the east of Commercial Street from 40 feet just east of Commercial, to 31 feet with 6-foot shoulders east of State Street, to 28 feet east of Ballou Street, to about 22 feet wide between its bend to the north and Hackberry Street, where it widens to about 24 feet extending to US 65.

- **Jackson Street** measured about 22 feet in width between Route 7 and Main Street. It narrowed to about 20 feet in width between Route 7 and Hillcrest Lane. As it extended into the County as Lake Road 7-63 it narrowed further to about 18 feet in width.

- **Polk Street** measured about 22 feet wide between Main Street and Route 7. North of Route 7, as it extended out of the City into the County as Lake Road 7-62, Polk Street narrowed to about 20 feet in width.

- **Commercial Street** measured about 24 feet in width from Main Street to Jackson Street. Northeast of Jackson Street, Commercial Street narrowed to about 20 feet until it reached the commercial area south of Route 7, where it widened again.

All four study routes are two lane thoroughfares. In the downtown area, on-street parking was provided along sections of Main Street where the wider street widths would allow this.

Existing Traffic Volumes: Twenty-four hour machine counts were completed by George Butler Associates on Friday through Monday, September 1,2,3, and 4, 2000. These traffic counts are summarized on the attached "Two-way Average Daily Traffic Volumes" exhibit and shown in more detail on the attached Appendix A - ADT, AM Peak Hour, & PM Peak Hour Volumes exhibits. As shown, the recorded traffic volumes were generally higher on the weekdays than on the weekends. The traffic volumes on **Main Street** were about 4500 to 4600 vehicles per day in the downtown area, and increased to about 7000 to 8000 vpd east of the Jackson / Arcadia Street intersection. The daily traffic volumes on **Jackson Street** ranged from about 350 to 450 vpd south of Truman Dam Access Road to about 4000 vpd west of the Main Street / Arcadia Street intersection. Traffic volumes on **Polk Street** were recorded at about 260 vpd south of Truman Dam Access Road and about 1200 vpd south of Route 7. **Commercial Street** was recorded to serve traffic volumes ranging from about 8750 to 8850 vpd south of Route 7 to about 2050 to 2350 vpd south of Jackson Street.

The highest peak hour traffic volumes were recorded on Commercial Street, south of Route 7, and on Main Street, west of US 65. At these locations, the peak directional hourly traffic volumes were recorded at about 400 to 500 vehicles per hour. At all other locations, the peak directional hour traffic volumes were less than 250 vph.

Existing Traffic Controls: Generally, traffic control along the four study routes is provided by stop signs on the minor side street approaches. One traffic signal is provided by the State of Missouri at the intersection of Commercial Street with Route 7. In addition, several three-way and four-way stop sign controlled intersections were observed along the four study routes. These locations include:

- Main Street and Van Buren Street
- Jackson Street and Commercial Street
- Jackson Street and Van Buren Street
- Jackson Street and Polk Street
- Jackson Street and Weist Street
- Jackson Street and Kennedy Street
- Polk Street / Lake Road 7-62 and Hillcrest Lane

A school zone was observed along Commercial Street between Gold and Osage Streets with a crossing intended between Niangua and Kosciusko Streets.

The posted speed limits along all four study routes is 25 mph, except for the school zone on Commercial Street and the section of Jackson Street along Lay Park where the speed limit is posted at 15 mph..

ANALYSES

Existing Traffic Controls: The existing stop sign traffic controls are adequate based on the traffic volumes and observed conditions. Although the three-way and four-way stop sign controls would not be warranted based on traffic volumes, sight distance restrictions appear to create the need for most of the all-way stop sign controls. In addition, analyses of traffic accident data was not included in the scope of this project as requested by the City. Therefore, accident history could not be included in the analysis of needs for traffic controls. No other sight distance problems were observed on the four study routes that would create a need for additional all-way stop sign controls.

The signing for the school zone along Commercial Street does not conform to the Manual on Uniform Traffic Control Devices. The School Crossing sign located north of Osage Street should be a School Zone Advance sign for northbound traffic. This advance sign would complement the School Zone Advance sign which exists south of Gold Street for southbound traffic. The school crossing between Niangua and Kosciusko Streets is missing a School Crossing sign for northbound traffic and the painted crosswalk striping across Commercial Street at this location.

In most areas along the four study routes, pavement markings were worn so much that they were difficult or impossible to see while driving. Generally, a dashed yellow center line had been applied to the four study routes some time ago. Along the section of Main Street from US 65 to about Gasoline Alley, a double yellow centerline and white edge lines had been applied.

Volume / Capacity Analysis: The recorded traffic volumes and vehicle speeds indicate that the operating level of service on all four study routes during this study was at LOS B or C based on the methods prescribed in the Highway Capacity Manual for Urban Streets. The recorded average speeds of traffic on all four study routes were about 15 to 24 mph during the study survey period. It should be noted that average travel speeds were not generally limited by vehicle densities, but instead by factors such as posted speed limits, on-street parking, school zones, and the all-way stop sign controls, where vehicles were either accelerating or decelerating.

In general, City streets like the four study route should have the capacity to serve about 9,000 to 10,000 vehicles per day. If routes like Commercial Street, south of Route 7, and Main Street, west of US 65 are widened to three lane sections to better serve left turns in the commercial areas, then the daily traffic volume capacity would increase to about 15,000 vpd.

SUMMARY / RECOMMENDATIONS

In general, it was determined that the City's major street system was adequate to serve existing traffic demands and short term traffic growth. Consideration should be given to widening the sections of Main Street from US 65 to the Jackson / Arcadia Street intersection, and Commercial Street through the commercial area south of Route 7, to provide a 36-foot wide pavement with curbs or with shoulders to allow a center two-way left turn lane. These sections are approaching the capacity limit for two lane arterial roadways and should be widened to accommodate traffic growth. If possible, consolidation and management of the numbers, widths, and spacings of driveway should be included in the design of the widening improvements.

The section of Commercial Street which is proposed to be constructed from Route 7 to the North Truman Dam Access Road should also be designed to provide a minimum of three 12-foot wide lanes for adequate capacity. The design of this new connection should include the realignment of Polk Street / Lake Road 7-62 to intersect the new extension of Commercial Street at least 300 feet south of the Truman Dam Access Road. The extension of Commercial Street should not be designed to intersect existing Polk Street / Lake Road 7-62 to the south of the Truman Dam Access Road because this would create overlapping left turn lanes along the section of Polk Street / Lake Road 7-62 between the two intersections.

The signing for the school zone along Commercial Street should be modified slightly to conform to the Manual on Uniform Traffic Control Devices. The School Crossing sign located north of Osage Street should be replaced with a School Zone Advance sign for northbound traffic. This advance sign would complement the School Zone Advance sign which exists south of Gold Street for southbound traffic. If a school crosswalk is to be maintained between Niangua and Kosciusko Streets, then a School Crossing sign should be added at this location for northbound traffic, and a crosswalk should be painted across Commercial Street at this location. Sidewalk improvements should also be provided along Commercial Street to accommodate the school pedestrian at this location.

It is recommended that a pavement marking design with a double yellow centerline and white edge lines be installed and maintained on all four of the study routes. With all the intersecting driveways and side streets, on-street parking, speed zones, all-way stop sign controls, and sight distance concerns, passing should not be allowed on any of the four study routes. The white edge lines would also help define the roadway edges along the ditch sections found on most study route segments.

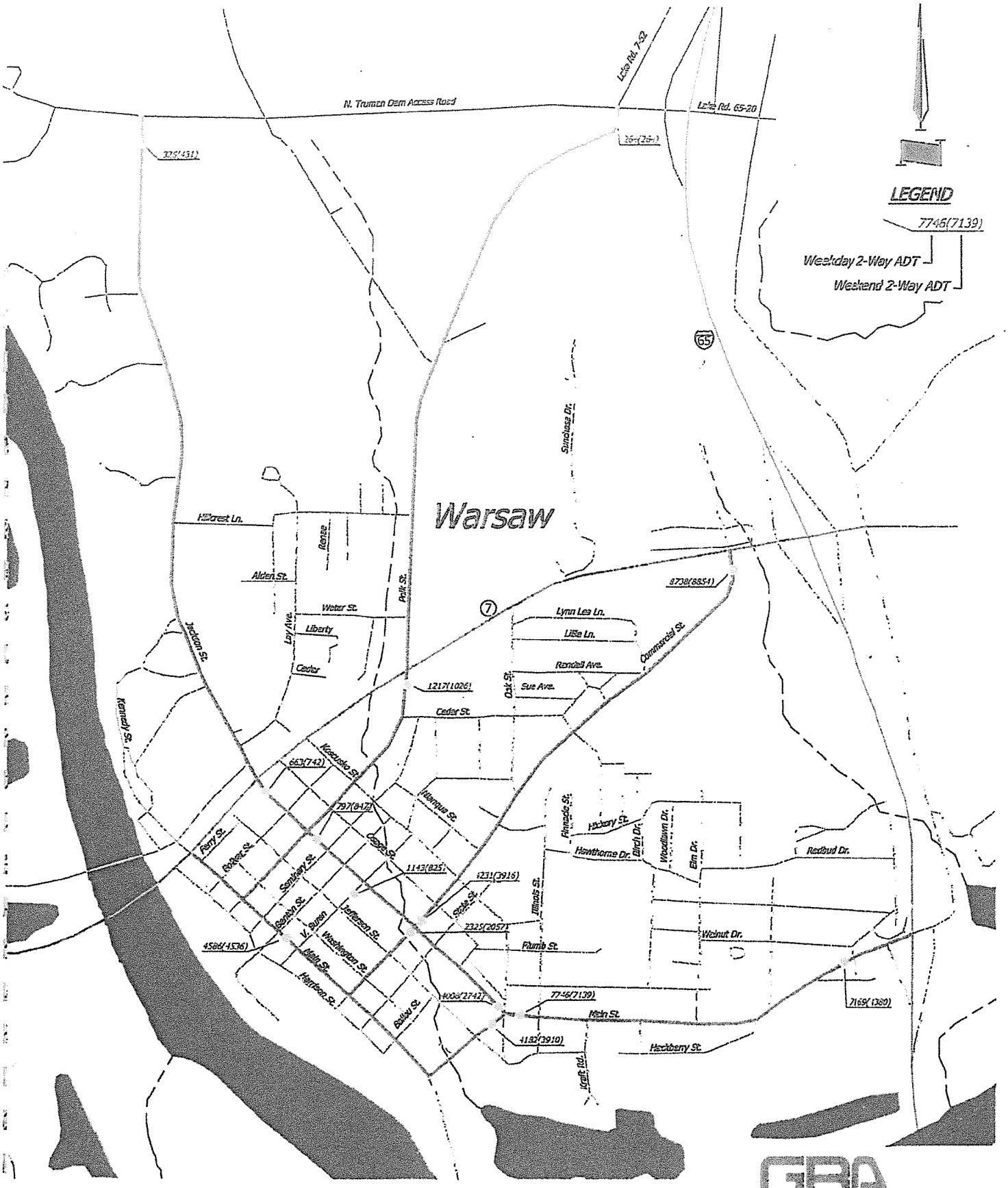
With the growth of tourist oriented traffic in the City, it is also recommended that a series of guide signs be designed and installed to direct the motorists to various destinations including parking lots, the Downtown area, the Fish Hatchery, the Truman Dam / Visitors Center, the City's River Front area, and other attractions. The more clearly the routes into and through town are marked, then the more efficient the unfamiliar driver be able to travel along the City's thoroughfares without restricting capacity of the roadways.

We greatly appreciate this opportunity to be of service to you on this project. If you should have any questions or concerns, please contact us.

GEORGE BUTLER ASSOCIATES, INC.

Paul M. Bertrand, P.E.
Senior Associate

TWO-WAY AVERAGE DAILY TRAFFIC VOLUMES



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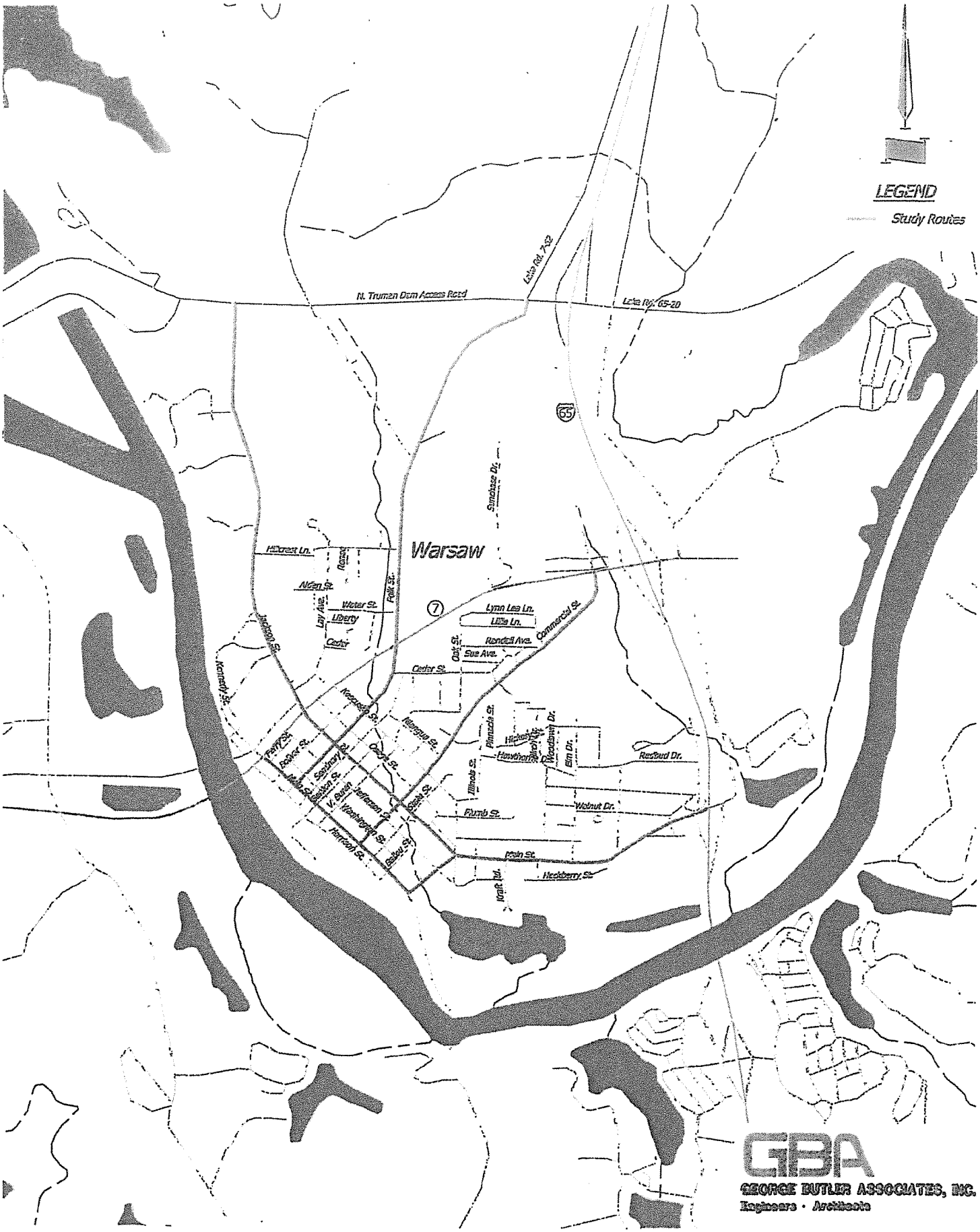
STUDY AREA



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AVERAGE STREET WIDTHS